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--538. A plate adapted for use in the anterior human cervical spine for contacting the anterior aspect of at least two cervical vertebral bodies, said plate comprising:

a lower surface for contacting the cervical vertebral bodies and an upper surface opposite said lower surface;

at least two bone screw receiving holes extending through said plate from said upper surface through said lower surface, each of said bone screw receiving holes being adapted to receive a bone screw for engaging each of the at least two cervical vertebral bodies to attach said plate to the cervical spine; and

a locking element adapted to lock to said plate only a single bone screw inserted in one of said at least two bone screw receiving holes, said locking element adapted to be coupled to said plate prior to the insertion of the bone screw into said bone screw receiving hole, said locking element being moveable from an initial position that permits the insertion of the bone screw into said bone screw receiving hole to a final position that is adapted to extend over at least a portion of the bone screw to retain the bone screw to said plate.

539. The plate of claim 538, further comprising at least one bone screw having a leading end for insertion into the cervical spine and a trailing end opposite said leading end, said trailing end including a surface generally transverse to a longitudinal axis of said screw, said locking element contacting said generally transverse surface of said bone screw.

540. The plate of claim 538, wherein said locking element is coupled to said plate.

541. The plate of claim 540, wherein said locking element is removably coupled to said plate.

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542. The plate of claim 538, wherein said locking element in the final position covers at least a portion of said bone screw receiving holes.
543. The plate of claim 538, wherein said locking element is adapted to be rotated from the initial position to the final position.
544. The plate of claim 543, wherein less than a full rotation of said locking element rotates said locking element from the initial position to the final position.
545. The plate of claim 538, wherein at least a portion of said locking element slides from the initial position to the final position.
546. The plate of claim 545, wherein said locking element slides over at least a portion of one of said bone screw receiving holes.
547. The plate of claim 545, wherein said locking element slides over at least a portion of the bone screws in said bone screw receiving holes.
548. The plate of claim 538, wherein said locking element comprises at least one of a screw, a rivet, and a cap.
549. The plate of claim 538, wherein said locking element includes a generally circular head having at least one cut-out segment.
550. The plate of claim 538, wherein said locking element comprises at least one of a camming surface, a ramped surface, and a threaded portion.
551. The plate of claim 538, wherein said locking element has a low profile so as to not interfere with overlying tissues and adjacent vessels and neurological structures when said locking element is in the final position.

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552. The plate of claim 538, wherein at least one end of said plate is configured to cooperatively engage a compression tool for movement of at least one vertebral body toward another vertebral body during installation of said plate.
553. The plate of claim 538, further comprising an access opening in said plate for accessing at least one vertebral body with a compression tool for movement of at least one vertebral body toward another vertebral body during installation of said plate.
554. The plate of claim 538, wherein said lower surface of said plate has a concave curvature configured to conform to the anterior aspect of at least a portion of two cervical vertebral bodies.
555. The plate of claim 538, wherein at least a portion of said lower surface is roughened to promote the growth of bone along said lower surface.
556. The plate of claim 538, wherein at least one of said bone screw receiving holes is configured to form an interference fit with a properly dimensioned bone screw to be received therein.
557. The plate of claim 538, wherein at least a first pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.
558. The plate of claims 557, wherein said bone screw receiving holes of at least one of said first and second pairs of bone screw receiving holes are generally arranged in side-by-side pairs.
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559. The plate of claim 538, wherein at least one of said bone screw receiving holes is oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second of said bone screw receiving holes is oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.

560. The plate of claim 538, wherein at least two of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a single cervical vertebral body adjacent a disc space to be fused.

561. The plate of claim 538, in combination with a fusion promoting substance.

562. The plate of claim 561, wherein said fusion promoting substance is at least in part other than bone.

563. The plate of claim 561, wherein said fusion promoting substance comprises bone morphogenetic protein.

564. The plate of claim 538, further comprising bone screws for engaging said plate to the cervical spine, wherein at least a portion of one of said plate, said locking element, and said bone screws is a bioresorbable material.

565. The plate of claim 564, wherein said bioresorbable material is at least in part bone.

566. A plate adapted for use in the anterior human cervical spine for contacting the anterior aspect of at least two cervical vertebral bodies, said plate comprising:

a lower surface for contacting the cervical vertebral bodies and an upper surface opposite said lower surface;

at least two bone screw receiving holes extending through said plate from said upper surface through said lower surface, each of said bone screw receiving holes being adapted to receive a bone screw for engaging each of the at least two cervical vertebral bodies to attach said plate to the cervical spine; and

a locking element adapted to lock to said plate only a single bone screw inserted in one of said at least two bone screw receiving holes, said locking element adapted to be coupled to said plate prior to the insertion of the bone screw into said bone screw receiving hole, said locking element being moveable from an initial position that permits the insertion of the bone screw into said bone screw receiving hole to a final position that is adapted to extend over at least a portion of said bone screw receiving hole into which the single bone screw is to be inserted.

567. The plate of claim 566, further comprising at least one bone screw having a leading end for insertion into the cervical spine and a trailing end opposite said leading end, said trailing end including a surface generally transverse to a longitudinal axis of said screw, said locking element contacting said generally transverse surface of said bone screw.

568. The plate of claim 566, wherein said locking element is coupled to said plate.

569. The plate of claim 568, wherein said locking element is removably coupled to said plate.

570. The plate of claim 566, wherein said locking element in the final position covers at least a portion of said bone screw receiving holes.

571. The plate of claim 566, wherein said locking element is adapted to be rotated from the initial position to the final position.

38 ³² 572. The plate of claim ^{31 37} 571, wherein less than a full rotation of said locking element rotates said locking element from the initial position to the final position.

39 ³³ 573. The plate of claim ^{24 32} 566, wherein at least a portion of said locking element slides from the initial position to the final position.

574. The plate of claim 573, wherein said locking element slides over at least a portion of one of said bone screw receiving holes.

575. The plate of claim 573, wherein said locking element slides over at least a portion of the bone screws in said bone screw receiving holes.

42 ²⁶ 576. The plate of claim ^{26 32} 566, wherein said locking element comprises at least one of a screw, a rivet, and a cap.

43 ³⁷ 577. The plate of claim ^{24 32} 566, wherein said locking element includes a generally circular head having at least one cut-out segment.

44 ³⁸ 578. The plate of claim ^{26 32} 566, wherein said locking element comprises at least one of a camming surface, a ramped surface, and a threaded portion.

45 ³⁹ 579. The plate of claim ^{26 32} 566, wherein said locking element has a low profile so as to not interfere with overlying tissues and adjacent vessels and neurological structures when said locking element is in the final position.

46 ⁴⁰ 580. The plate of claim ^{26 32} 566, wherein at least one end of said plate is configured to cooperatively engage a compression tool for movement of at least one vertebral body toward another vertebral body during installation of said plate.

47 ⁴¹ 581. The plate of claim ^{26 32} 566, further comprising an access opening in said plate for accessing at least one vertebral body with a compression tool for movement of at

least one vertebral body toward another vertebral body during installation of said plate.

582. The plate of claim 566, wherein said lower surface of said plate has a concave curvature configured to conform to the anterior aspect of at least a portion of two cervical vertebral bodies.

583. The plate of claim 566, wherein at least a portion of said lower surface is roughened to promote the growth of bone along said lower surface.

584. The plate of claim 566, wherein at least one of said bone screw receiving holes is configured to form an interference fit with a properly dimensioned bone screw to be received therein.

585. The plate of claim 566, wherein at least a first pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.

586. The plate of claims 585, wherein said bone screw receiving holes of at least one of said first and second pairs of bone screw receiving holes are generally arranged in side-by-side pairs.

587. The plate of claim 566, wherein at least one of said bone screw receiving holes is oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second of said bone screw receiving holes is oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.

46 588. The plate of claim ^{26 32} 566, wherein at least two of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a single cervical vertebral body adjacent a disc space to be fused.

53 47 589. The plate of claim ^{26 32} 566, in combination with a fusion promoting substance.

55 47 590. The plate of claim ⁴⁷ 589, wherein said fusion promoting substance is at least in part other than bone.

57 591. The plate of claim ⁴⁷ 589, wherein said fusion promoting substance comprises bone morphogenetic protein.

58 592. The plate of claim ^{26 32} 566, further comprising bone screws for engaging said plate to the cervical spine, wherein at least a portion of one of said plate, said locking element, and said bone screws is a bioresorbable material.

58 593. The plate of claim ^{50 57} 592, wherein said bioresorbable material is at least in part bone.

59 594. A plate adapted for use in the anterior human cervical spine for contacting the anterior aspect of at least two cervical vertebral bodies, said plate comprising:
a lower surface for contacting the cervical vertebral bodies and an upper surface opposite said lower surface;
at least two bone screw receiving holes extending through said plate from said upper surface through said lower surface, each of said bone screw receiving holes being adapted to receive a bone screw for engaging each of the at least two cervical vertebral bodies to attach said plate to the cervical spine; and
said plate having a non-detachable locking portion adapted to lock to said plate only a single bone screw inserted in one of said at least two bone screw receiving holes,

said locking portion being moveable from an initial position that permits the insertion of the bone screw into said bone screw receiving hole to a final position that is adapted to extend over at least a portion of the bone screw hole to retain the bone screw to said plate.

83 595. The plate of claim ~~594~~^{52 64}, further comprising at least one bone screw having a leading end for insertion into the cervical spine and a trailing end opposite said leading end, said trailing end including a surface generally transverse to a longitudinal axis of said screw, said locking portion contacting said generally transverse surface of said bone screw.

59 596. The plate of claim ~~594~~^{52 64}, wherein said locking portion in the final position covers at least a portion of said bone screw receiving holes.

65 597. The plate of claim ~~594~~^{52 64}, wherein said locking portion has a low profile so as to not interfere with overlying tissues and adjacent vessels and neurological structures when said locking portion is in the final position.

68 598. The plate of claim ~~594~~^{52 64}, wherein at least one end of said plate is configured to cooperatively engage a compression tool for movement of at least one vertebral body toward another vertebral body during installation of said plate.

69 599. The plate of claim ~~594~~^{52 64}, further comprising an access opening in said plate for accessing at least one vertebral body with a compression tool for movement of at least one vertebral body toward another vertebral body during installation of said plate.

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The plate of claim 594, wherein said lower surface of said plate has a concave curvature configured to conform to the anterior aspect of at least a portion of two cervical vertebral bodies.

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The plate of claim 594, wherein at least a portion of said lower surface is roughened to promote the growth of bone along said lower surface.

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The plate of claim 594, wherein at least one of said bone screw receiving holes is configured to form an interference fit with a properly dimensioned bone screw to be received therein.

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The plate of claim 594, wherein at least a first pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.

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The plate of claims 603, wherein said bone screw receiving holes of at least one of said first and second pairs of bone screw receiving holes are generally arranged in side-by-side pairs.

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The plate of claim 594, wherein at least one of said bone screw receiving holes is oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second of said bone screw receiving holes is oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.

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606. The plate of claim ~~594~~^{52 64}, wherein at least two of said bone screw receiving holes are oriented in said plate to overlies the anterior aspect of a single cervical vertebral body adjacent a disc space to be fused.

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607. The plate of claim ~~594~~^{52 64}, in combination with a fusion promoting substance.

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78 608. The plate of claim ~~607~~^{64 76}, wherein said fusion promoting substance is at least in part other than bone.

66 609. The plate of claim ~~607~~⁶⁴, wherein said fusion promoting substance comprises bone morphogenetic protein.

67 610. The plate of claim ~~594~~⁵², further comprising bone screws for engaging said plate to the cervical spine, wherein at least a portion of one of said plate, said locking element, and said bone screws is a bioresorbable material.

68 611. The plate of claim ~~610~~^{67 80}, wherein said bioresorbable material is at least in part bone.

81 612. A plate adapted for use in the anterior human cervical spine for contacting the anterior aspect of at least two cervical vertebral bodies, said plate comprising:
a lower surface for contacting the cervical vertebral bodies and an upper surface opposite said lower surface;
at least two bone screws each having a central longitudinal axis and being adapted to engage each of the at least two cervical vertebral bodies, respectively;
at least two bone screw receiving holes extending through said plate from said upper surface through said lower surface, each of said bone screw receiving holes having a central longitudinal axis and being adapted to receive one of said bone screws to attach said plate to the cervical spine; and

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a locking element adapted to lock to said plate only one of said bone screws inserted in one of said at least two bone screw receiving holes, said locking element having a central longitudinal axis and being adapted to engage a respective one of said bone screw receiving holes with the central longitudinal axis of said locking element being substantially coaxial with the central longitudinal axis of a respective one of said bone screw receiving holes, said locking element contacting a respective one of said bone screws so as to align the central longitudinal axis of said locking element with the central longitudinal axis of said bone screw to retain one of said bone screws to said plate.

613. The plate of claim 612, wherein said locking element is configured to threadably engage one of said bone screw receiving holes.

614. The plate of claim 612, wherein said lower surface of said plate has a concave curvature configured to conform to the anterior aspect of at least a portion of two cervical vertebral bodies.

615. The plate of claim 612, wherein at least a first pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.

616. The plate of claim 612, wherein at least two of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a single cervical vertebral body adjacent a disc space to be fused.

617. The plate of claim 612, in combination with a fusion promoting substance.

618. The plate of claim 617, wherein said fusion promoting substance is at least in part other than bone.

619. The plate of claim 617, wherein said fusion promoting substance comprises bone morphogenetic protein.

620. The plate of claim 612, in combination with a bioresorbable material.

621. A plate adapted for use in the anterior human cervical spine for contacting the anterior aspect of at least two cervical vertebral bodies, said plate comprising:

a lower surface for contacting the cervical vertebral bodies and an upper surface opposite said lower surface;

at least two bone screws each having a central longitudinal axis and being adapted to engage each of the at least two cervical vertebral bodies, respectively, each of said bone screws having a leading end for insertion into the cervical spine and a trailing end opposite said leading end, at least one of said bone screws including proximate said trailing end a contact surface area generally transverse to the central longitudinal axis of said bone screw;

at least two bone screw receiving holes extending through said plate from said upper surface through said lower surface, each of said bone screw receiving holes having a central longitudinal axis and being adapted to receive one of said bone screws to attach said plate to the cervical spine; and

a locking element adapted to lock to said plate only one of said bone screws inserted in one of said bone screw receiving holes, said locking element contacting said generally transverse contact surface area of a respective one of said bone screws so as to retain said respective one of said bone screws to said plate.

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622. The plate of claim 621, wherein said locking element is configured to threadably engage one of said bone screw receiving holes.
623. The plate of claim 621, wherein said lower surface of said plate has a concave curvature configured to conform to the anterior aspect of at least a portion of two cervical vertebral bodies.
624. The plate of claim 621, wherein at least a first pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.
625. The plate of claim 621, wherein at least two of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a single cervical vertebral body adjacent a disc space to be fused.
626. The plate of claim 621, in combination with a fusion promoting substance.
627. The plate of claim 626, wherein said fusion promoting substance is at least in part other than bone.
628. The plate of claim 626, wherein said fusion promoting substance comprises bone morphogenetic protein.
629. The plate of claim 621, in combination with a bioresorbable material.
630. A plate adapted for use in the anterior human cervical spine for contacting the anterior aspect of at least two cervical vertebral bodies, said plate comprising:

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a lower surface for contacting the cervical vertebral bodies and an upper surface opposite said lower surface;

at least two bone screws each having a central longitudinal axis and being adapted to engage each of the at least two cervical vertebral bodies, respectively, each of said bone screws having a leading end for insertion into the cervical spine and a trailing end opposite said leading end, at least one of said bone screws including proximate said trailing end a maximum cross sectional dimension transverse to the central longitudinal axis of said bone screw, said bone screw having a contact surface area at the maximum cross sectional dimension;

at least two bone screw receiving holes extending through said plate from said upper surface through said lower surface, each of said bone screw receiving holes having a central longitudinal axis and being adapted to receive one of said bone screws to attach said plate to the cervical spine; and

a locking element adapted to lock to said plate only one of said bone screws inserted in one of said bone screw receiving holes, said locking element adapted to engage a respective one of said bone screw receiving holes and to contact said contact surface area of a respective one of said bone screws so as to retain said respective one of said bone screws to said plate.

631. The plate of claim 630, wherein said locking element is configured to threadably engage one of said bone screw receiving holes.

632. The plate of claim 630, wherein said lower surface of said plate has a concave curvature configured to conform to the anterior aspect of at least a portion of two cervical vertebral bodies.

633. The plate of claim 630, wherein at least a first pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.

634. The plate of claim 630, wherein at least two of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a single cervical vertebral body adjacent a disc space to be fused.

635. The plate of claim 630, in combination with a fusion promoting substance.

636. The plate of claim 635, wherein said fusion promoting substance is at least in part other than bone.

637. The plate of claim 635, wherein said fusion promoting substance comprises bone morphogenetic protein.

638. The plate of claim 630, in combination with a bioresorbable material.

639. A plate adapted for use in the anterior human cervical spine for contacting the anterior aspect of at least two cervical vertebral bodies, said plate comprising:

a lower surface for contacting the cervical vertebral bodies and an upper surface opposite said lower surface;

at least two bone screws each having a central longitudinal axis and being adapted to engage each of the at least two cervical vertebral bodies, respectively, each of said bone screws having a leading end for insertion into the cervical spine and a trailing end opposite said leading end, said trailing end including a lower surface generally transverse to the central longitudinal axis of said screw;

at least two bone screw receiving holes extending through said plate from said upper surface through said lower surface, each of said bone screw receiving holes having a reduced dimension proximate said lower surface of said plate to form a seat, said seat having a substantially planar surface adapted to contact said lower surface of one of said bone screws; and

a locking element adapted to lock to said plate only one of said bone screws inserted in one of said at least two bone screw receiving holes, said locking element contacting at least a portion of said bone screw so as to retain a respective one of said bone screws to said plate.

640. The plate of claim 639, wherein said locking element is configured to threadably engage one of said bone screw receiving holes.

641. The plate of claim 639, wherein said lower surface of said plate has a concave curvature configured to conform to the anterior aspect of at least a portion of two cervical vertebral bodies.

642. The plate of claim 639, wherein at least a first pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a first cervical vertebral body adjacent a disc space to be fused and at least a second pair of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a second cervical vertebral body adjacent the disc space to be fused.

643. The plate of claim 639, wherein at least two of said bone screw receiving holes are oriented in said plate to overlie the anterior aspect of a single cervical vertebral body adjacent a disc space to be fused.

644. The plate of claim 639, in combination with a fusion promoting substance.